

**MD. BELAL HOSSAIN**

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**RESEARCH INTERESTS**

Soil-water-plant relationship, Crop modeling, Irrigation management, Groundwater management, Agriculture drought mitigation, Water quality, Climate change impact on agriculture, Water resources management, Hydrological modeling, soil water and plant relationship

**RESEARCH EXPERIENCE (Ongoing projects only)**

<b>Project title: "Model development for agricultural drought assessment and its mitigation for rainfed rice (T. Aman) cultivation"</b>	January 2020- present
<i>Position:</i> Principal investigator <i>Brief outline:</i> The project aims to quantify the water shortage during crop growth stages and assess the need for supplemental irrigation of rainfed rice cultivation. Weather parameters temperature, humidity, wind speed, sunshine hour, rainfall etc. soil physical parameters likes texture, bulk density, hydraulic conductivity is used as input parameters. Penmann-Monteith method is adopted to calculate reference evapotranspiration. Agricultural drought is calculated considering effective rainfall, crop water requirement and soil moisture contribution. This model is effective to predict drought occurrence and need for supplemental irrigation with the forecast weather parameters.	
<b>Project title: "Modeling climate change impact on agriculture and developing mitigation and adaptation strategies for sustainable agricultural production in Bangladesh"</b>	July 2015 – present
<i>Position:</i> Working scientist	
<i>Brief outline:</i> The objectives of this project are to assessment and characterization of climate variability and climate change, soil and plant processes as influenced by climatic variability and climate change, calibration and validation of crop simulation model, vulnerability assessment for agri-production in relation to climate change. Different crop simulation models likes DSSAT, DNDC, CROPWAT, AQUACROP, INFOCROP, and GIS tools ArcGIS and QGIS is used to in this study. I am particularly working on calibration and validation of DSSAT model to simulate yield and growth parameters of Rice, Wheat and Maize crops. Currently I am working on vulnerability assessment of rice crop under changing climate situation using DSSAT model, mitigation of GHG emission for cereal crops using DNDC model. I also did some works on water requirement and water productivity of popular cropping patterns using modeling approaches.	
<b>Project title: "Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India"</b>	February 2018 – present
<i>Position:</i> Working scientist	
<i>Brief outline:</i> This project is jointly funded and supported by the ACIAR, Australia. Our purposes from this project are to develop a regional scale understanding of the surface water and groundwater resources, understanding the salt and water dynamics of the polders, test of suitable cropping options.	
<b>Project title: "Groundwater resources management for sustainable crop production in the North-west hydrological region of Bangladesh."</b>	February 2017 – present
<i>Position:</i> Co-investigator	
<i>Brief outline:</i> This research is funded by the IDA and IFAD, which aims to assess groundwater availability and recharge pattern in different districts of northwest hydrological region of Bangladesh, to optimize groundwater abstraction for crop production, to find out optimum use of water through intervention of water management technologies for sustainable groundwater utilization	

## WORK EXPERIENCE

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### Senior Scientific Officer

May 2018 – present

Irrigation & Water Management (IWM) Division, Bangladesh Rice Research Institute (BRRI),  
Gazipur, Bangladesh

*Responsibilities:* Formulation of new research experiments and field observation of the ongoing experiments conducted by IWM Division; collection of different soil and water data from the field, laboratory analysis of soil and water, statistical analysis, decision making, report writing, seminar, training, etc.

### Scientific Officer

June 2012 – May 2018

Irrigation & Water Management (IWM) Division, Bangladesh Rice Research Institute (BRRI),  
Gazipur, Bangladesh

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*Responsibilities:* Formulation of new research experiments and field observation of the ongoing experiments conducted by IWM Division; collection of different soil and water data from the field, laboratory analysis of soil and water, statistical analysis, decision making, report writing, seminar, training, etc.

## EDUCATION

### Master of Science in Irrigation and Water Management

December 2011

Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

*Dissertation title:* “Irrigation Scheduling of Wheat Using Pan Evaporation Method”

*CGPA:* 3.32 (out of 4.00)

### Bachelor of Science in Agricultural Engineering

December 2009

Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

*CGPA:* 3.474 (out of 4.00)

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## TECHNICAL SKILLS

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- Crop models and Statistical tools: DSSAT, DNDC, CROPWAT, AQUACROP, R (basic), STAR
- Other: QGIS, Python

## PUBLICATIONS

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**Hossain, M. B.**, Roy, D., Mahmud, M. N. H., Paul, P. L. C., Yesmin, M. S., Kundu, P. K. 2021. Early transplanting of rainfed rice minimizes irrigation demand by utilizing rainfall. *Environmental Systems Research* 10, 34 (2021). <https://doi.org/10.1186/s40068-021-00239-z>.

**Hossain, M. B.**, Roy, D., Maniruzzaman, M., Biswas, J. C., Naher, U. A., Haque, M. M., Kalra, N. 2021. Response of Crop Water Requirement and Yield of Irrigated Rice to Elevated Temperature in Bangladesh, *International Journal of Agronomy*, vol. 2021, Article ID 9963201, 11 pages, 2021. <https://doi.org/10.1155/2021/9963201>

Kamruzzaman, M., Shahid, S., Islam, A.T., Hwang, S., Zaman, M. A. U., Ahmed, M., **Hossain, M. B.** 2021. Comparison of CMIP6 and CMIP5 model performance in simulating historical precipitation and temperature in Bangladesh: a preliminary study. *Theor Appl Climatol* . <https://doi.org/10.1007/s00704-021-03691-0>

Haque, M. M., Biswas, J. C., Maniruzzaman, M., **Hossain, M. B.**, & Islam, M. R. 2021. Water management and soil amendment for reducing emission factor and global warming potential but improving rice yield. *Paddy and Water Environment*, 1-13. <http://dx.doi.org/10.1007/s10333-021-00851-w>

Choudhury, A. K., Molla, M., Zahan, T., Sen, R., Biswas, J. C., Akhter, S., Istiaque, S., Ahmed, F., Maniruzzaman, M., **Hossain, M. B.**, Sarker, P. C., Dessoky, E. S., Hassan, M. M. and Hossain, A. 2021. Optimum Sowing Window and Yield Forecasting for Maize in Northern and Western Bangladesh Using CERES Maize Model. *Agronomy*, 11(4), 635.

Naher, U. A., Biswas, J. C., Maniruzzaman, M., Ahmed, F., Sarker, I. U., Jahan, A., Hera, M. H. R., Hossain, **M. B.**, **Islam, A.**, Islam, M. R. and Kabir, M. S. 2021. Bio-Organic Fertilizer: A Green Technology to Reduce Synthetic N and P Fertilizer for Rice Production. *Frontiers in plant science*, 12, 152.

- Biswas, J. C., **Hossain, M. B.**, Maniruzzaman, M., Haque, M. M., Akhter, S., Naher, U. A., Rahman, M. M., Adhay, T. K. & Sutton, M. A. (2021). Spatio-temporal distribution of reactive nitrogen species in relation to wheat cultivation in Bangladesh. *SN Applied Sciences*, 3(1), 1-9.
- Hossain, M. B.**, Maniruzzaman, M., Biswas, J. C., Haque, M. M. and Kalra, N. 2020. Irrigation strategy for crop production in northwest and southwest region of Bangladesh. *The Agriculturists*, 18(2): 126-139.
- Sarker, K. K., SK. S. A. Kamar., M. A. Hossain., M. Mainuddin., R. Bell., Ed G. Barrett-Lennard., D. Gaydon., M. Glover., M. H. Rashid., M. S. I. Khan., M. Maniruzzaman., **M. B. Hossain.**, and B. C. Sarker. 2020. Effects of Fresh and Saline Water Irrigation for Maize in Coastal Areas of Bangladesh. *Proceedings 2019*, 36, 144; doi:10.3390/proceedings2019036144
- Naher, U. A., **M. B. Hossain.**, M. M. Haque., M. Maniruzzaman., A. K. Choudhury., and J. C. Biswas. 2020. Effect of long-term nutrient management on soil organic carbon sequestration in rice-rice-fallow rotation. *Current science*, 118 (4), 587-592.
- Bell, R. W., M. Mainuddin., E. G. Barrett-lennard., S. K. Sarangi., M. Maniruzzaman., K. Brahmachari., Khokan Kumer Sarker., D. Burman., D. S. Gaydon., J. M. Kirby., M. Glover., Md. Harunor Rashid., M. Sahidul islam Khan., M. E. Kabir., M. A. Rahman., and **M. B. Hossain.** 2019. *Cropping systems intensification in the coastal zone of the Ganges delta: Opportunities and risks*. *J. Indian Soc. Coastal Agric. Res.* 37(2): 153-161.
- Maniruzzaman, M., M. Mainuddin., R. Bell., J. C. Biswas., M. J. Kabir., **M. B. Hossain.**, M. S. Yesmin., A. B. M. Mostafizur., and P. K. Kundu. 2020. Rescheduling of Wet Season (T. Aman) Rice Planting for Cropping Intensification in Coastal Bangladesh. *Proceedings 2019*, 36, 32; doi:10.3390/proceedings2019036032.
- Yesmin, M. S., M. Maniruzzaman., **M. B. Hossain.**, D. S. Gaydon., A. B. M. Mostafizur., M. J. Kabir., J. C. Biswas., M. Mainuddin., and R. W. Bell. 2019. Selection of Suitable Sowing Window for Boro Rice in Coastal Regions of Bangladesh. *J. Indian Soc. Coastal Agric. Res.* 37(2): 134-143.
- Hossain, M. B.**, M. Maniruzzaman., M. S. Yesmin., A. B. M. Mostafizur., P. K. Kundu., M. J. Kabir., J. C. Biswas., and M. Mainuddin. 2019. Water and Soil Salinity Dynamics and Dry Season Crop Cultivation in Coastal Region of Bangladesh. *J. Indian Soc. Coastal Agric. Res.* 37(2): 24-31.
- M. Maniruzzaman., M. J. Kabir., **M. B. Hossain.**, S. Yesmin., A. B. M. Mostafizur., J. C. Biswas., M. A. Ali., M. Mainuddin., and R. W. Bell. 2019. Adjustment in Wet Season Rice Planting for Cropping Intensification in Coastal Bangladesh. *J. Indian Soc. Coastal Agric. Res.* 37(2): 123-133.
- Biswas, J. C., M. Maniruzzaman., M. M. Haque., **M. B. Hossain.**, M. M. Rahman., U. A. Naher., M. H. Ali., & W. Kabir. 2018. *Extreme Climate Events and Fish Production in Bangladesh*. *Environment and Natural Resources Research*; 9 (1), 1-9.
- Biswas, J. C., A. F. M. T. Islam., M. M. Haque., M. Maniruzzaman., **M. B. Hossain.**, A. K. Choudhury., U. A. Naher., M. H. Ali., W. Kabir., N. Kalra and S. Rahnamayan. 2019. Socio-Ecological Vulnerabilities and Major Cereal Crops Production in Bangladesh. *Journal of Food Science and Engineering* 9 (2019) 231-243
- Maniruzzaman, M., J.C. Biswas., **M.B. Hossain.**, M.M. Haque., U. A. Naher, and N. Kalra. 2018. Extreme Climatic Events and Rice Production in Bangladesh. *Environment and Natural Resources Research*; Vol. 8, No. 4; 2018. ISSN 1927-0488 E-ISSN 1927-0496. pp.62-76.
- Maniruzzaman, M., J.C. Biswas., **M.B. Hossain.**, M.M. Haque., U. A. Naher, A.K. Choudhury., S. Akhter., F. Ahmed., R. Sen., S. Ishtiaque., M.M. Rahman., and N. Kalra. (2018) Effect of Elevated Air Temperature and Carbon Dioxide Levels on Dry Season Irrigated Rice Productivity in Bangladesh. *American Journal of Plant Sciences*, 9, 1557-1576. <https://doi.org/10.4236/ajps.2018.97114>
- Jatish C. Biswas, Naveen Kalra, M. Maniruzzaman, A.K. Choudhury, M.A.H.S. Jahan, **M.B. Hossain**, S. Ishtiaque, M.M. Haque, Wais Kabira. 2018. Development of mungbean model (MungGro) and its application for climate change impact analysis in Bangladesh. *Ecological Modelling* 384 (2018) 1–9.
- Apurba K. Choudhury, S. Ishtiaque, R. Sen, M.A.H.S. Jahan, S. Akhter, F. Ahmed, Jatish C. Biswas, M. Maniruzzaman, **M. B. Hossain**, M. Muinnuddin Miah, M. M. Rahman, Taslima Zahan, A.S.M.M.R. Khan and Naveen Kalra. 2018. Calibration and Validation of DSSAT Model for Simulating Wheat Yield in Bangladesh. *Haya: Saudi J. Life Sci.*, Vol-3, Iss-4 (Apr, 2018): 356-364
- Jatish C B, M Maniruzzaman, **M B Hossain**, Hazrat A, Wais K, N Kalra. 2018. Model Development for Life Cycle Assessment of Rice Yellow Stem Borer under Rising Temperature Scenarios. *Curr Inves Agri Curr Res* 2(4). CIACR.MS.ID.000144.
- M Maniruzzaman, JC Biswas, **M B Hossain**, MM Haque, UA Naher, A Biswas, AK Choudhury, S Akhter, F Ahmed, MM Rahman and N Kalra. 2017. Evaluating the CERES-Rice model under dry season irrigated rice in Bangladesh: Calibration and validation. *Journal of Agricultural and Crop Research* Vol. 5(6), pp. 96-107.
- S. Ishtiaque, R. Sen, M. A. H. S. Jahan, Apurba K. Choudhury, S. Akhter, F. Ahmed, Jatish C. Biswas, M. Maniruzzaman, M. Muinnuddin Miah, M. M. Rahman, A. S. M. M. R. Khan, Naveen Kalra & **M. B. Hossain.**

2018. Simulating Wheat Yield under Changing Temperature, Carbon Dioxide and Solar Radiation Levels in Bangladesh. *Global Journal of Science Frontier Research: D Agriculture and Veterinary*. Vol. 18(2), pp. 27-36.
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- Biswas, J. C., M. Maniruzzaman., U. A. Naher., M. M. Haque., **M. B. Hossain.**, M. M. Rahman., M. M. U. Miah., A. K. Choudhury., S. Akter., F. Ahmed., M. A. Hamid., N. Kalra., J. Furuya. Future Climate Change Scenarios and Anticipated Performance of Major Cereals in Bangladesh. *International Journal of Agriculture and Environmental Research*. Volume:03, Issue:06 "November-December 2017". Pp-4123-4148.
- Haque, M. M., J. C. Biswas., M. Maniruzzaman., A. K. Choudhury., U. A. Naher., **M. B. Hossain.**, S. Akter., F. Ahmed and N. Kalra. Greenhouse Gas Emissions from Selected Cropping Patterns and Adaptation Strategies in Bangladesh. *International Journal of Development Research* Vol. 07, Issue, 11, pp.16832-16838, November, 2017
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- Hossain, M B.**, D Roy, P L C Paul and M T Islam. 2016. Water Productivity Improvement Using Water Saving Technologies in Boro Rice Cultivation. Published in *Bangladesh Rice J.* 20 (1) : 17-22, 2016
- J.C. Biswas, **M. B. Hossain**, A.K. Choudhury, N. Kalra and M. Maniruzzaman. 2017. Climatic Variability and Wet Season Rice (*Oryza sativa* L.) Production in North-West Bangladesh. *The Agriculturists* 15(1): 68-80 (2017)
- Paul PLC, Rashid MA, Alam MM, Ghani MA, **Hossain, M B** (2016). Selection of Profitable Rice Based Cropping System Under Prevailing Water Environment in Satkhira District of Bangladesh. *Acad. J. Agric. Res.* 4(9): 581-588.
- Hossain, M. B.**, K. F. I. Murad, S. B. Ekram, N. M. F. Rahman, M. R. Talukder and M. Ahmed. 2015. Irrigation Scheduling of Wheat using Pan Evaporation Method. *International Journal of Innovative Research in Advanced Engineering (IJIRAE)*. Issue 10, Volume 2 (October 2015).
- Hossain, M. B.**, S. B. Ekram, N. M. F. Rahman, M. M. Hasan and T. Farhat. 2014. Distribution System of Irrigation Water in Bangladesh: A Case Study of Bangladesh Agricultural University Farm. *International Journal of Innovative Science, Engineering & Technology*, Vol. 1 Issue 10, December 2014.

#### NOTABLE TRAINING/ CONFERENCE ATTENDED

<b>Data analysis and report writing</b>	2019
ACIAR, Australia	
<b>Hands on training on DSSAT</b>	2019
Bangladesh Rice Research Institute	
<b>Experimental Design and Data Analysis Training Course</b>	2017
Bangladesh Rice Research Institute	
<b>Training of Trainers on Concept and Practice of Integrated Water Resources Management</b>	2016
Center for Environmental and Geographic Information Services (CEGIS), Dhaka, Bangladesh	
<b>Programming R for Experimental Design and Data Analysis</b>	2016
Bangladesh Rice Research Institute	
<b>Modern Rice Production Training</b>	2014
Bangladesh Rice Research Institute	

#### LANGUAGES

Bengali: Fluent  
Mother tongue

English: Proficient

## **REFERENCES**

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